Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Diagnosis, evaluation and follow-up of asymptomatic microhematuria (AMH) in adults: AUA guideline.

Bibliographic Source(s)

Davis R, Jones JS, Barocas DA, Castle EP, Lang EK, Leveillee RJ, Messing EJ, Miller SD, Peterson AC, Turk TM, Weitzel W. Diagnosis, evaluation and follow-up of asymptomatic microhematuria (AMH) in adults: AUA guideline. Linthicum (MD): American Urological Association Education and Research, Inc. (AUA); 2012 May. 30 p. [217 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version:

Grossfeld GD, Litwin MS, Wolf JS Jr, Hricak H, Shuler CL, Agerter DC, Carroll PR. Evaluation of asymptomatic microscopic hematuria in adults: the American Urological Association best practice policy--part II: patient evaluation, cytology, voided markers, imaging, cystoscopy, nephrology evaluation, and follow-up. Urology 2001 Apr;57(4):604-10. [32 references]

Grossfeld GD, Litwin MS, Wolf JS, Hricak H, Shuler CL, Agerter DC, Carroll PR. Evaluation of asymptomatic microscopic hematuria in adults: the American Urological Association best practice policy--part I: definition, detection, prevalence, and etiology. Urology 2001 Apr;57(4):599-603. [29 references]

Recommendations

Major Recommendations

Definitions for the body of evidence strength (grade A, B, or C), the strength of the recommendations (Standard, Recommendation, Option), and for statements labeled as Clinical Principle and Expert Opinion are provided at the end of the "Major Recommendations" field.

Diagnostic and Work-up Framework

The guideline statements below are organized to follow and provide the rationale for the accompanying algorithm (available from the American Urological Association, Inc. (AUA) Web site).

Guideline Statement 1. Asymptomatic microhematuria (AMH) is defined as three or greater red blood cells per high powered field (RBC/HPF) on a properly collected urinary specimen in the absence of an obvious benign cause. A positive dipstick does not define AMH, and evaluation should be based solely on findings from microscopic examination of urinary sediment and not on a dipstick reading. A positive dipstick reading merits microscopic examination to confirm or refute the diagnosis of AMH. *Expert Opinion*

Guideline Statement 2. The assessment of the asymptomatic microhematuria patient should include a careful history, physical examination, and laboratory examination to rule out causes of AMH such as infection, menstruation, vigorous exercise, medical renal disease, viral illness, trauma, or recent urological procedures. *Clinical Principle*

Guideline Statement 3. Once benign causes have been ruled out, the presence of asymptomatic microhematuria should prompt urologic evaluation. *Recommendation (Evidence strength – Grade C; Benefits outweigh risks/burdens)*

Guideline Statement 4. At the initial evaluation, an estimate of renal function should be obtained (may include calculated estimated glomerular filtration rate [eGFR], creatinine, and blood urea nitrogen [BUN]) because intrinsic renal disease may have implications for renal related risk during the evaluation and management of patients with AMH. *Clinical Principle*

Guideline Statement 5. The presence of dysmorphic red blood cells, proteinuria, cellular casts, and/or renal insufficiency or any other clinical indicator suspicious for renal parenchymal disease warrants concurrent nephrologic workup but does not preclude the need for urologic evaluation. *Recommendation (Evidence strength – Grade C; Benefits outweigh risks/burdens)*

Guideline Statement 6. Microhematuria that occurs in patients who are taking anti-coagulants requires urologic evaluation and nephrologic evaluation regardless of the type or level of anti-coagulation therapy. *Recommendation Discussion. (Evidence strength – Grade C; Benefits outweigh risks/burdens)*

Guideline Statement 7. For the urologic evaluation of asymptomatic microhematuria, cystoscopy should be performed on all patients aged 35 years and older. *Recommendation Discussion. (Evidence strength – Grade C; Benefits outweigh risks/burdens)*

Guideline Statement 8. In patients younger than age 35 years, cystoscopy may be performed at the physician's discretion. Option *(Evidence strength – Grade C; Balance between benefits and risks/burdens unclear)*

Guideline Statement 9. Cystoscopy should be performed on all AMH patients who present with risk factors for urinary tract malignancies (e.g., history of irritative voiding symptoms, current or past tobacco use, chemical exposures) regardless of age. *Clinical Principle*

Guideline Statement 10. The initial evaluation for AMH should include a radiologic evaluation. Multi-phasic computed tomography (CT) urography (without and with intravenous [IV] contrast), including sufficient phases to evaluate the renal parenchyma to rule out a renal mass and an excretory phase to evaluate the urothelium of the upper tracts, is the imaging procedure of choice because it has the highest sensitivity and specificity for imaging the upper tracts. *Recommendation (Evidence strength – Grade C; Benefits outweigh risks/burdens)*

Guideline Statement 11. For patients with relative or absolute contraindications that preclude use of multiphasic CT (such as renal insufficiency, iodinated contrast allergy, pregnancy), magnetic resonance urography (MRU) (without/with intravenous contrast) is an acceptable alternative imaging approach. *Option (Evidence strength – Grade C; Balance between benefits and risks/burdens unclear)*

Guideline Statement 12. For patients with relative or absolute contraindications that preclude use of multiphasic CT (such as renal insufficiency, iodinated contrast allergy, pregnancy) where collecting system detail is deemed necessary, combining magnetic resonance imaging (MRI) with retrograde pyelograms (RPGs) provides alternative evaluation of the entire upper tracts. *Expert Opinion*

Guideline Statement 13. For patients with relative or absolute contraindications that preclude use of multiphasic CT (such as renal insufficiency, iodinated contrast allergy) and MRI (such as presence of metal in the body) where collecting system detail is deemed necessary, combining non-contrast CT or renal ultrasound with RPGs provides alternative evaluation of the entire upper tracts. *Expert Opinion*

Guideline Statement 14. The use of urine cytology and urine markers (Nuclear Matrix Protein 22 [NMP22], bladder tumor antigen [BTA]-stat, and UroVysion fluorescence in situ hybridization assay [FISH]) is NOT recommended as a part of the routine evaluation of the asymptomatic microhematuria patient. *Recommendation (Evidence strength – Grade C; Risks/burdens outweigh benefits)*

Guideline Statement 15. In patients with microhematuria present following a negative work up or those with other risk factors for carcinoma in situ (e.g., irritative voiding symptoms, current or past tobacco use, chemical exposures), cytology may be useful. *Option (Evidence strength – Grade C; Balance between benefits and risks/burdens uncertain)*

Guideline Statement 16. Blue light cystoscopy should not be used in the evaluation of patients with asymptomatic microhematuria. *Recommendation (Evidence strength – Grade C; Risks/burdens outweigh benefits)*

Guideline Statement 17. If a patient with a history of persistent asymptomatic microhematuria has two consecutive negative annual urinalyses (one per year for two years from the time of initial evaluation or beyond), then no further urinalyses for the purpose of evaluation of AMH are necessary. *Expert Opinion*

Guideline Statement 18. For persistent asymptomatic microhematuria after negative urologic workup, yearly urinalyses should be conducted. *Recommendation (Evidence strength – Grade C; Benefits outweigh risks/burdens)*

Guideline Statement 19. For persistent or recurrent asymptomatic microhematuria after initial negative urologic work-up, repeat evaluation within three to five years should be considered. *Expert Opinion*

Definitions:

Body of Evidence Strength

Grade A: Well-conducted randomized controlled trials (RCTs) or exceptionally strong observational studies

Grade B: RCTs with some weaknesses of procedure or generalizability or generally strong observational studies

Grade C: Observational studies that are inconsistent, have small sample sizes, or have other problems that potentially confound interpretation of data

American Urological Association (AUA) Nomenclature Linking Statement Type to Evidence Strength

Standard: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade A or B evidence

Recommendation: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade C evidence

Option: Non-directive statement that leaves the decision regarding an action up to the individual clinician and patient because the balance between benefits and risks/burdens appears equal or appears uncertain based on Grade A, B, or C evidence

Clinical Principle: A statement about a component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature

Expert Opinion: A statement, achieved by consensus of the Panel, that is based on members' clinical training, experience, knowledge, and judgment for which there is no evidence

Clinical Algorithm(s)

The original guideline includes an accompanying algorithm on the management of asymptomatic microhematuria (AMH) in adults (see the "Availability of Companion Documents" field).

Scope

Disease/Condition(s)

Asymptomatic microscopic hematuria

Note: For the purpose of this guideline, microhematuria is defined by the presence of three or more red blood cells (RBCs) per high-powered field (HPF) on microscopic examination of one properly-collected, non-contaminated urinalysis with no evidence of infection for which a combination of microscopic urinalysis and dipstick excludes other abnormalities such as pyuria, bacteriuria, and contaminants. In addition, benign causes, such as menstruation, vigorous exercise, viral illness, trauma, and infection, have been excluded.

Guideline Category

Diagnosis

Evaluation

Management

Risk Assessment

Clinical Specialty

Family Practice

Internal Medicine

Nephrology

Obstetrics and Gynecology

Urology

Intended Users

Advanced Practice Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To provide a clinical framework for the diagnosis, evaluation, and follow-up of asymptomatic microhematuria (AMH)
- To provide direction to clinicians and patients regarding how to work up and follow patients with the finding of AMH

Target Population

Adults with asymptomatic microscopic hematuria

Interventions and Practices Considered

1. Verification of presence of asymptomatic microhematuria (AMH) based on three or greater red blood cells per high powered field (RBC/HPF) on a properly collected urinary specimen
2. History, physical examination, and laboratory examination to rule out causes of AMH
3. Urologic evaluation
4. Renal function tests including calculated estimated glomerular filtration rate (eGFR), creatinine, and blood urea nitrogen (BUN)
5. Nephrologic workup for renal parenchymal disease when indicated
6. Cystoscopy for all patients aged 35 years and older and at the physician's discretion in younger patients
7. Multi-phasic computed tomography (CT) urography (without and with intravenous [IV] contrast)
8. Magnetic resonance urography (MRU) (without/with intravenous contrast)
9. Combining magnetic resonance imaging (MRI) with retrograde pyelograms (RPGs) as an alternative for evaluation of the entire upper tracts
10. Combining non-contrast CT or renal ultrasound with RPGs as alternative for evaluation of the entire upper tracts
11. Use of urine cytology and urine markers (Nuclear Matrix Protein 22 [NMP22], bladder tumor antigen [BTA]-stat, and UroVysion fluorescence in situ hybridization assay [FISH]) (not recommended during the initial evaluation)
12. Cytology for patients with microhematuria present following a negative work up or those with other risk factors for carcinoma in situ
13. Blue light cystoscopy (specifically not recommended)
14. Follow-up examinations and urinalyses (if appropriate)

Major Outcomes Considered

- Sensitivity, specificity, and accuracy of diagnostic tests
- Rate of urinary tract malignancies in individuals with asymptomatic microhematuria (AMH)
- Rate of non-malignant disease processes in individuals with AMH
- Safety of diagnostic tests
- Patient burdens of diagnostic tests

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A systematic review was conducted to identify published articles relevant to the diagnostic yield of mass screening for microhematuria (MH) as well as the work-up and follow-up of adult patients with asymptomatic microhematuria (AMH). Literature searches were performed on English language publications using the MEDLINE database from January 1980 to November 2011. Data from studies published after the literature search cut-off will be incorporated into the next version of this guideline. Preclinical studies (e.g., animal models), pediatric studies, commentary, and editorials were excluded. Review article references were checked to ensure inclusion of all possibly relevant studies. Multiple reports on the same patient group were carefully examined to ensure inclusion of only non-redundant information. The review yielded an evidence base of 192 articles from which to construct a clinical framework for the diagnosis, work-up, and follow-up of AMH.

Number of Source Documents

The review yielded an evidence base of 192 articles from which to construct a clinical framework for the diagnosis, work-up, and follow-up of asymptomatic microhematuria (AMH).

Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Body of Evidence Strength

Grade A: Well-conducted randomized controlled trials (RCTs) or exceptionally strong observational studies

Grade B: RCTs with some weaknesses of procedure or generalizability or generally strong observational studies

Grade C: Observational studies that are inconsistent, have small sample sizes, or have other problems that potentially confound interpretation of data

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Quality of Individual Studies and Determination of Evidence Strength

Quality of individual studies that were randomized controlled trials (RCTs), controlled clinical trials, or comparative observational studies was assessed using the Cochrane Risk of Bias tool. Because there is no widely-agreed upon quality assessment tool for single cohort observational studies, the quality of these studies was not assessed except in the case of diagnostic accuracy studies. Diagnostic accuracy studies were rated using the QUADAS (Quality Assessment of Diagnostic Accuracy Studies).

The categorization of evidence strength is conceptually distinct from the quality of individual studies. Evidence strength refers to the body of evidence available for a particular question and includes consideration of study design, individual study quality, consistency of findings across studies, adequacy of sample sizes, and generalizability of samples, settings, and treatments for the purposes of the guideline (see the "Rating Scheme for the Strength of the Evidence" field).

Limitations of the Literature

The Panel proceeded with full awareness of the limitations of the microhematuria (MH) literature. These limitations included poorly-defined patient groups, heterogeneous patient groups, or patient groups with limited generalizability; use of different asymptomatic microhematuria (AMH) work-up thresholds; use of different AMH work-up protocols; failure to follow all patients; and limited follow-up durations. The completed evidence report may be requested from the AUA (see the "Availability of Companion Documents" field). Literature limitations and interpretation are also discussed in the "Background" section of the original guideline document.

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

The Asymptomatic Microhematuria Panel was created in 2009 by the American Urological Association Education and Research, Inc. (AUA). The Practice Guidelines Committee (PGC) of the AUA selected the Panel Chair and Vice Chair who in turn appointed the additional panel members with specific expertise in this area. Publications from the literature search were used to create the majority of the clinical framework. For some clinical issues, there was little or no evidence from which to construct evidence-based statements. Where gaps in the evidence existed, the Panel provides guidance in the form of Clinical Principles or Expert Opinion with consensus achieved using a modified Delphi technique if differences of opinion emerged.

Rating Scheme for the Strength of the Recommendations

The American Urological Association (AUA) nomenclature system explicitly links statement type to body of evidence strength and the Panel's judgment regarding the balance between benefits and risks/burdens.

AUA Nomenclature Linking Statement Type to Evidence Strength

Standard: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade A or B evidence

Recommendation: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade C evidence

Option: Non-directive statement that leaves the decision regarding an action up to the individual clinician and patient because the balance between benefits and risks/burdens appears equal or appears uncertain based on Grade A, B, or C evidence

Clinical Principle: A statement about a component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature

Expert Opinion: A statement, achieved by consensus of the Panel, that is based on members' clinical training, experience, knowledge, and judgment for which there is no evidence

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

The American Urological Association (AUA) conducted a thorough peer review process. The draft guidelines document was distributed to 59 peer reviewers, of which 30 reviewers provided comments. The panel reviewed and discussed all submitted comments and revised the draft as needed. Once finalized, the guideline was submitted for approval to the Practice Guidelines Committee (PGC), and finally to the AUA Board of Directors for final approval. The guideline was approved by the AUA Board of Directors in May, 2012.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for most treatment recommendations (see the "Major Recommendation" field). Where evidence was lacking, recommendations are supported by expert opinion or consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate management of asymptomatic microhematuria (AMH)

Potential Harms

- Infectious risk of cystoscopy is low.
- To minimize radiation exposure of the patient (with multi-phasic computed tomography [CT] urography), low x-ray tube voltage (kV), high current exposure time product (mAs), and adaptive statistical iterative reconstruction algorithm (ASIR) settings are advocated. Field limitation to the area of interest and shielding of thyroid and sternum are recommended.
- Use of ultrasound (US) with or without intravenous urography (IVU) presents significant risks for missed diagnoses. Although serious findings are rare in the asymptomatic microhematuria (AMH) patient, and particularly in younger AMH patients and in patients without risk factors, they have been reported, and their presence requires a prompt clinical response. Therefore, the Panel judged that use of these modalities is an alternative, but less optimal imaging strategy.
- The use of iodinated contrast (with multi-phasic CT urography) is a well-known cause of acute renal failure, especially in patients with impaired renal function.
- A history should be obtained from all patients with regard to prior contrast administration and potential allergic reactions. In addition, the Panel suggests that consideration for pre-medication with steroids be given to patients with a documented history of contrast reaction. See the original guideline document for additional detail.
- The risk of contrast reaction to gadolinium (nephrogenic systemic fibrosis) (with magnetic resonance urography [MRU]) in patients with renal insufficiency is uncertain but may be severe in some patients with advanced renal insufficiency. If there is abnormal renal function, then

a nephrologist may be helpful to assess the risk from gadolinium.
- The risks/burdens of urinalyses are minimal.

Contraindications

Contraindications

- The use of intravenous contrast material may be contraindicated in some patients with renal insufficiency.
- Relative or absolute contraindications that preclude use of multiphasic computed tomography (CT) include renal insufficiency, iodinated contrast allergy, and pregnancy.
- Magnetic resonance imaging (MRI) is contraindicated by the presence of certain metal implants in the body.

Qualifying Statements

Qualifying Statements

This document constitutes a clinical strategy and is not intended to be interpreted rigidly. The most effective approach for a particular patient is best determined by the individual clinician and patient. As the science relevant to asymptomatic microhematuria (AMH) evolves and improves, the strategies presented here will require amendment to remain consistent with the highest standards of clinical care.

Limitations of the Literature

The Panel proceeded with full awareness of the limitations of the microhematuria (MH) literature. These limitations included poorly-defined patient groups, heterogeneous patient groups, or patient groups with limited generalizability; use of different AMH work-up thresholds; use of different AMH work-up protocols; failure to follow all patients; and limited follow-up durations. The completed evidence report may be requested from American Urological Association (AUA) (see the "Availability of Companion Documents" field). Literature limitations and interpretation are also discussed in the "Background" section of the original guideline document.

Disclaimer

While these guidelines do not necessarily establish the standard of care, AUA seeks to recommend and to encourage compliance by practitioners with current best practices related to the condition being treated. As medical knowledge expands and technology advances, the guidelines will change. Today, these evidence-based guideline statements represent not absolute mandates but provisional proposals for treatment under the specific conditions described in each document. For all these reasons, the guidelines do not preempt physician judgment in individual cases.

Treating physicians must take into account variations in resources, and patient tolerances, needs, and preferences. Conformance with any clinical guideline does not guarantee a successful outcome. The guideline text may include information or recommendations about certain drug uses ('off label') that are not approved by the Food and Drug Administration (FDA), or about medications or substances not subject to the FDA approval process. AUA urges strict compliance with all government regulations and protocols for prescription and use of these substances. The physician is encouraged to carefully follow all available prescribing information about indications, contraindications, precautions, and warnings. These guidelines are not intended to provide legal advice about use and misuse of these substances.

Although guidelines are intended to encourage best practices and potentially encompass available technologies with sufficient data as of close of the literature review, they are necessarily time-limited. Guidelines cannot include evaluation of all data on emerging technologies or management, including those that are FDA-approved, which may immediately come to represent accepted clinical practices.

For this reason, the AUA does not regard technologies or management which are too new to be addressed by these guidelines as necessarily experimental or investigational.

Implementation of the Guideline

Description of Implementation Strategy

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Davis R, Jones JS, Barocas DA, Castle EP, Lang EK, Leveillee RJ, Messing EJ, Miller SD, Peterson AC, Turk TM, Weitzel W. Diagnosis, evaluation and follow-up of asymptomatic microhematuria (AMH) in adults: AUA guideline. Linthicum (MD): American Urological Association Education and Research, Inc. (AUA); 2012 May. 30 p. [217 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2001 Apr (revised 2012 May)

Guideline Developer(s)

American Urological Association Education and Research, Inc. - Medical Specialty Society

Source(s) of Funding

American Urological Association, Inc. (AUA)

Guideline Committee

Asymptomatic Microscopic Hematuria Guidelines Panel

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

All panel members completed conflict-of-interest disclosures. Relationships that have expired (more than one year old) since the panel's initial meeting, are listed. Those marked with (C) indicate that compensation was received; relationships designated by (U) indicate no compensation was received.

Consultant/Advisor: Rodney Davis, Corrections Corp of America (C); J. Stephen Jones, Cook (C), GSK, (C), Pfizer (C), Predictive Biosciences (C), GTX (C) (expired), Amgen (C) (expired); Andrew Charles Peterson, American Medical Systems Inc. (C); Daniel Ari Barocas, Bayer (C), Dendreon (C), GE Healthcare (C), Ferring, (C) (expired), Janssen (C); Erik P. Castle, Baxter (C) (expired)

Meeting Participant or Lecturer: J. Stephen Jones, Endocare (C), Abbott (C), Pfizer (C), GSK (C) (expired); Raymond J. Leveillee, Applied Medical (C), Cook Urological (C), Intuitive (C); Andrew Charles Peterson, American Medical Systems Inc. (C); Erik P. Castle, Intuitive Surgical (C)

Scientific Study or Trial: J. Stephen Jones, Photocure (C); Raymond J. Leveillee, Intio (U), Angiodynamics (U) (expired), Covidien (C) (expired); Andrew Charles Peterson, American Medical Systems Inc. (C)

Other: J. Stephen Jones, Endocare (C), Abbott (C); Scott David Miller, Georgia Urology Pathology Lab (Owner) (C); William Weitzel, Arbor Ultrasound Technologies (C); Celerison Inc (C); Daniel Ari Barocas, Allergan (C); Erik P. Castle, Ethicon Endosurgery (C) (expired)

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version:

Grossfeld GD, Litwin MS, Wolf JS Jr, Hricak H, Shuler CL, Agerter DC, Carroll PR. Evaluation of asymptomatic microscopic hematuria in adults: the American Urological Association best practice policy--part II: patient evaluation, cytology, voided markers, imaging, cystoscopy, nephrology evaluation, and follow-up. Urology 2001 Apr;57(4):604-10. [32 references]

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Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the American Urological Association, Inc. (AUA) Web site .

Availability of Companion Documents

The following is available:

- Diagnosis, Evaluation and Follow-Up of Asymptomatic Microhematuria (AMH) in Adults: AUA Guideline Algorithm (2012). Available from the American Urological Association, Inc. (AUA) Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on November 7, 2001. The information was verified by the guideline developer as of December 24, 2001. This NGC summary was updated by ECRI Institute on July 24, 2012. The updated information was verified by the guideline developer on August 30, 2012.

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